

thus,* the Mexican E. horripilus, Lem., and perhaps the South American E. Odierii, Lem., and E. Cummingii, Salm, this species forms a small section of Echinocacti with the appearance of Mamillariæ, named by Prince Salm, (Hort. Dyck., 1849, p. 34,) Theloidei. Through the Coryphanthæ they are nearly allied to Mamillaria, while our species at least, (the fructification of the others not being known,) by its dry fruit, its black tuberculated seeds, and especially the large and curved embryo and the presence of an albumen, proves itself a true Echinocactus, very closely connected with the regularly ribbed E. intertextus, Eng. Cact., Mex. Bound. t. 34. The similarity in all essential organs of these two species is such that no system ought to separate them, proving again of how little essential importance among Cactaceæ the external form must be regarded; another striking example, among many, is the rat-tail Cereus tuberosus, and its globular or oval

allies, C. cæspitosus, etc.

Full grown specimens are 3-5 inches high and 3-4 inches in diameter; dark green tubercles, loosely arranged in 37 or 13 order, 8 and 13 spirals being most prominent; tubercles 6-8 lines long, at base 6-7 l. wide in the vertical and 4-5 l. in the transverse diameter, fruit-bearing ones rather shorter and stouter; areolæ 3-4 l. long; external spines 4-6 l. long, whitish, with the addition of several bristles at the upper end of the areola; central spines 5-7 l. long, yellow, reddish, deep brown, or even black, upwards. Flowers 8-10 l. long, and of nearly the same diameter, with a short and wide tube, externally greenish purple, petals yellowish-green verging to pale purple; the short stamens arise from the whole inner surface of the tube, leaving only a very small nectariferous space in its base; funiculus very short, stout and straight, and not curved over the micropyle, as I have found it in almost all other cactus flowers examined. Fruit 3-3½ l. long, about the same in width, with 1-3 small calycine scales towards its flat top, each with 1 or 2 small spines in its axil; it usually bursts irregularly on the side, and, falling off, leaves its base adhering to the areola, as is the case in other dry-fruited Echinocacti; e. g. E. horizonthalonius. Seeds 1½ l. long in the longest diameter, covered with minute closely set tubercles, with a large oval subbasilar hilum, and an embryo strongly curved around a small albumen. The plant germinates with



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^{*} Mamillaria papyracantha, Eng. Pl. Fendl., p. 49; Syn. Cact., p. 8. A closer examination of the dry specimen obtained by Mr. Fendler near Santa Fé proves that the floral areola joins the spiniferous one on the top of the small nascent tubercles, making the plant an Echinocactus, according to the views at present prevalent. It is singular that Fendler's single specimen has remained, thus far, the only one ever obtained of this well marked species.

erect pointed cotyledons, and when a few weeks old begins

to develop its then pubescent spines.

Var. β . with smaller tubercles in $\frac{8}{27}$ or $\frac{13}{34}$, or even $\frac{21}{54}$ order, closely set, bearing smaller but often more numerous spines, (20-28 ext., 6-7 int.) may be confounded with the simple mountain form of $Mam.\ vivipara$, from which, when not in flower or fruit, only a close examination can distinguish it.

3. Echinocactus pubispinus, spec. nov.: parvus turbinatus; costis 13 subobliquis compressis interruptis; areolis orbiculatis; aculeis breviusculis velutinis demum nudatis albidis apice adustis, radialibus inferioribus lateralibusque 5-8 brevioribus, superioribus 1-2 robustioribus rectis curvatis seu hamatis, centrali deficiente seu singulo robustiore

longiore arrecto sursum hamato.

Pleasant Valley, near Salt Lake Desert, found in May without flower or fruit, but exhibiting in the vestiges of the small supraspiral floriferous areolæ the character of the genus. Perhaps the smallest species of the genus, 2 inches high, 1–1½ in diameter; ribs formed by compressed confluent tubercles; areolæ 4–6 lines apart; radial spines 1–4 l. long, more densely pubescent, or even tomentose, than I have seen them in any other Cactus; on the lower areolæ 5 or 6, on the upper ones 9–12; here and there a single central spine makes its appearance, 5–6 l. long, stouter, and always strongly hooked.

4. Echinocactus Whipplei, Engelm. & Bigelow, Cact. Whipp. p. 28, t. 1; Syn. Cact., p. 15; Ives' Exped. Bot., p. 12. Var. spinosior: aculeis radialibus 9–11, inferioribus sæpe obscurioribus, reliquis longioribus niveis, summis 2 sæpe elongatis latioribus curvatis; centralibus 4, summo longo plano flexuoso, cæteris paulo brevioribus obscuris, solo infimo seu

omnibus hamatis.

Desert Valley, west of Camp Floyd, Utah, with the remnants of flowers and fruit, and with seeds hid between the spines, exactly like the seeds figured in the plate cited above; embryo curved about a around a large albumen; stigmas 6-7. The locality is about 5 degrees north of the place where Dr. Bigelow, and afterwards Dr. Newberry, found the plant.

5. Cereus viridiflorus, Engelm.; evidently the most northern Cereus, found as far north as the Laramie region, and not rare in Colorado, where it occurs 1-3 inches high, mostly with 13 ribs, and with the greatest variability in the color of the radial spines, and in the presence of the 1-2 central ones.

6. Cereus Engelmanni, Parry: in the Salt Lake Desert, far to the northwest of the country where it was originally discovered; always characterized by the cruciate central spines.

7. Opuntia sphærocarpa, Eng. & Big. var.? Utahensis: diffusa; articulis orbiculato-obovatis crassis, junioribus





sæpe globoso-obovatis vix tuberculatis; areolis subapproximatis; foliis minutis subulatis divaricatis; setis brevissimis, aculeis nullis seu parvulis seu rarius singulo longiore recto robusto albido; floribus sulphureis; sepalis exterioribus transversis obcordatis cuspidatis; petalis 8 late obovatis emarginatis; stigmatibus 8 brevibus erectis; bacca obovata areolis sub-25 stipata; seminibus irregulariter compressis anguste

marginatis.

In the Pass, west of Steptoe Valley, in the Utah basin; in flower and fruit at the end of July. Joints 2-3 inches long, and of nearly the same diameter; areolæ 6-8 lines apart; leaves smaller than in any other of our species, except O. basilaris, scarcely 1 line long; bristles few on young, none on old joints, about ½ l. long; stouter spines, when present, ¾-1 inch long. Flowers 3 inches in diameter, pale or sulphuryellow; fruit 1 inch long, half as thick, with a very deep umbilicus and with a few bristles, or here and there a minute spine on the areolæ—in the specimens before me apparently fleshy, but perhaps dry at full maturity; seeds very irregular, 2 l. or in the longest diameter 2½ l. wide. Loth to increase the number of illy defined species, I provisionally attach this to the New Mexican O. sphærocarpa, of which, however, leaves and flowers are as yet unknown, and the fruit is rather different.

8. Opuntia hystericina, Eng. & Big., is evidently a western representative, or may be a western form, of O. Missouriensis. (See Bot., Ives' Exp., p. 14.) It was collected in the present Territory of Nevada, between Walker and Carson Rivers. Flowers 2½-3 inches wide, larger than in Dr. Newberry's specimen; stigmas 8-10, short, erect.

9. Opuntia Missouriensis, DeC., itself is not rare in the deserts between Salt Lake Valley and Rush Valley. Var. Albispina, approaching to var. trichophora, was found on Smith Creek, Lookout Mountains; flower 3-3½ inches in diameter; ovary with 20 or 25 scarcely spiny areolæ; 5 very

short erect stigmas.

10. Opuntia fragilis, Haw. Suppl., p. 82; Cactus fragilis, Nutt., gen. I, p. 296. Fort Kearney to the North Platte country, in flower in June and July. This, I believe, is the first time, since Nuttall's discovery in 1813, that the flowers of this species were collected. Travellers report the plant very common on the sterile prairies at the foot of the Rocky Mountains, but rarely found in flower, and still more rarely in fruit; it seems to propagate principally by the extremely brittle joints, which even the wind is apt to break off and carry about. I have had for many years specimens in cultivation, brought by Dr. Hayden, but have never been able to obtain flowers. Nuttall says the flowers are solitary and small; in the specimen before me they are nearly 2 inches in

densely cover white spines; petals 5 obova mens; stigma 11. OPUNTI mlis obovato. hasi ovata su albidos rectos sen deflexum foris purpure oligeris dens breviter cuspi obovatis obtu aribus subere Sandy des This is one of and belongs it is readily o and purple fl 1 line long; 14-12 inches bristly spines

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diameter, pale yellow; ovary 8-9 l. long, with 13-15 areolæ, densely covered with white wool, the upper ones with a few white spines; lower sepals broadly oval, with a short cusp; petals 5 obovate, roundish, crenulate; style longer than sta-

mens; stigmas 5, short, cuspidate, erect.

11. Opuntia pulchella, spec. nov.: parvula, diffusa; articulis obovato-clavatis leviter tuberculatis; foliis minutis e basi ovata subulatis; areolis confertis, superioribus aculeos albidos rectos, singulum longiorem complanatum porrectum seu deflexum, cæteros brevissimos radiantes gerentibus; floris purpurei ovario areolis 13–15 albo-villosissimis et aculeoligeris dense stipato; sepalis inferioribus lineari-oblongis breviter cuspidatis, superioribus cuneato-spatulatis; petalis 8 obovatis obtusis; stylo cylindrico exserto, stigmatibus 5 linearibus suberectis.

Sandy deserts on Walker River, Nevada; fl. in June. This is one of the smallest and prettiest species of the genus and belongs to the section Clavatæ (Syn. Cact., p. 46); it is readily distinguished from its allies by the small joints and purple flowers. Joints $1-1\frac{1}{4}$ inches long; leaves scarcely 1 line long; flower bright purplish red or deep rose red, $1\frac{1}{4}-1\frac{1}{2}$ inches in diameter; ovary 4-5 l. long, beset with white bristly spines, 15-25 on each areola; style not ventricose in the lower half, as is usual in this genus;* stigmas slender, pale yellow.

From other sources I am enabled to give the following further Additions and Corrections to my former publications:

Many Eumamillariæ (Syn. Cact., p. 4) have an "ovarium exsertum;" not only the large flowered Longimammæ, which approach closely to Corypantha, deviate in this respect from the assumed character of the subgenus, but in a great many other species I find the same peculiarity; so that I am inclined to restrict the ovarium immersum to that natural subdivision, the Lactescentes, already recognized by Zuccarini; probably all those with limpid juice have an exsert ovary.

Mamillaria barbata, Eng. This species is easily propagated by seed, and is apt to flower already in the second year. The first flowers in spring (May) appear in the axils of the last, innermost tubercles of the last year, and are, therefore, almost central; the later ones seem to be developed from the axils of the first tubercles of the same spring! Flowers 9–10 l. long, of the same diameter; tube constricted above the exsert oval ovary; 12–13 exterior green sepals, lanceolate, cuspidate, fimbriate, 8 interior ones, reddish, longer, lance-linear,

^{*} Another deviation from the usual form I observe in the style of O. coccionellifera; from a very narrow and short base it is suddenly dilated 5 or 6 times its diameter, and then gradually contracts upwards.

slightly ciliate; 18-21 petals, rose red, with a deeper colored streak, lance-linear, shorter and narrower than the inner sepals, entire; stamens not half as long as petals, with oval anthers; style much longer than stamens, with 5-6 short, greenish yellow suberect stigmas.

Mamillaria bicolor, Lehm., is not a Texan plant, as has been stated, inadvertently, in Synops. p. 7. Dr. Poselger found it on another Rio Grande, between Tampico and Real

del Monte, Mex.

Mamillaria papyracantha, Eng., is an Echinocactus, as stated above.

Mamillaria recurvispina, Eng., in Cact. Mex. Bound., p. 12; Syn. p. 10. As there is already a species named thus by Vriese, (see Walp. Rep. 2, p. 301,) I now name the Arizona species M. recurvata. M. recurva, Lehm., is a form of

M. macracantha, D.C., fide Salm.

Cereus variabilis, thus named in Cact. Mex. Bound., p. 40 t. 60, f. 5-6, and in Synops. p. 31, is not Pfeiffer's plant, figured in Abbild. 2, t. 15, but seems to be, as regards fruit and seeds, identical with a species obtained by Dr. Poselger near Tampico, and decided by him to be C. princeps, Hort. Würzb. ex-Pfeiff. Enum. p. 108. Plants from the Rio Grande have repeatedly bloomed here at the late Mr. Grieve's, and as the flower has never been described, I here supply the omission. Fruit and seed, obtained near Matamoras, have been described and figured in Mex. Bound. Cact. 1. c.

Flores ad apicem caulis ramorumve pauci magni albi nocturni; ovario ovato areolis aculeolatis 25-30 stipato; tubo elongato cylindrico sursum sensim ampliato areolis 16-20 vix squamigeris, inferioribus aculeolatis munito; sepalis superioribus 20-25 lanceolatis patulis reflexisve; petalis 40-50 pluriseriatis lineari-lanceolatis patentissimis; staminibus superiori tubi parti gradatim adnatis; stigmatibus 12-13 in capitulum clavato-obovatum coarctatis pallide virescentibus.

In bloom from July to September, flower 7-8 inches long, 5½-6 inches wide; tube 4-5 inches long; lower sepals near the well defined upper edge of the tube reddish green, 3-9 lines, upper ones petaloid, 9-18 l. long; petals 2 inches long, and about 4 l. wide; lower part of tube for 2 or 2½ inches, with a naked, nectariferous surface; the upper part, 2½-3 inches, densely beset with stamens of about equal length, so that the mass of the anthers form a deep funnel, corresponding to the shape of the upper part of the tube; the outer series of stamens forms a regular crown, but is not separated from the inner lower ones by a naked belt, such as is found in many species; nor are the filaments declined, and, so to say, fasciculated. This is interesting, as it weakens the value of this arrangement of stamens as a generic or subgeneric character; nevertheless, it is one of the few general charac-

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MISSOURI BOTANICAL GARDEN ters left us number of lately estal disposition 1. Cerei f

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ters left us, to be used in the arrangement of the very large number of species of this protean genus, to which several lately established genera have to be reduced. The following disposition is suggested:

1. Cerei flore regulari, plerumque breviore; staminibus tubo gradatim adnatis.

Echinocereus, Eng.
Acanthocereus.
Lepidocereus, Eng.
Pilocereus, Lem.

2. Cerei flore sæpe obliquo, plerumque longiore; corona staminum exteriorum erectorum a cæteris gradatim adnatis plus minus declinatis discreta.

Echinopsis, Zucc.
Eucereus.
Phyllocactus, Link.
Disisocactus, Lindl.

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Under the name Acanthocereus I comprise the species of this division with spiny fruit, but not belonging to Echinocereus; it is probable that Pfeiffera, Salm, is only a diminutive form of Acanthocereus. Lepidocereus, to which many tropical species must be referred, and also a few which lately have been classed with Pilocereus, is distinguished from the latter by the uniformity of the fertile and sterile branches and areolæ, while in Pilocereus the fertile areolæ are closer together and densely beset with bristly spines or long wool. Eucereus, in a more restricted sense than Miquel has used it in his Genera, or 9 in the Synopsis, would comprise the largest number of Cerei of the second division, of very different external shape, and would probably have to be again subdivided when we get to know more of the fructification of the different species. Neither Echinopsis nor Phyllocactus do in their flowers differ from Eucereus, and Disisocactus is but a depauperate Phyllocactus, with scarcely more than the crown of stamens left, a few single ones representing the great mass of inner stamens of the allied sections. I am as yet undecided whether Epiphyllum, as restricted by Prince Salm, has also to be united with Cereus or not; the fasciculated declined stamens spring from the whole tube; the exterior ones form no crown, but the innermost ones are separated from the rest, and form, with their confluent bases, a kind of vault, which is arched over the base of the tube. I have had no opportunity to examine fruit and seed.

I am not sure whether the true *Cereus variabilis* is also found on the Lower Rio Grande. A specimen in Mr. Gæbel's horticultural establishment, said to come from that region, has repeatedly flowered and borne fruit; the flowers opened in May, and the fruit ripened after 10 or 11 months; flower 9 inches long, white, open only at night; ovary angular, with

MISSOURI BOTANICAL GARDEN 5 or 6 triangular scales, but no spines; long tube with about 8 scales; crown of exterior stamens distant from the others 8 or 9 lines; about 10 filiform spreading stigmas; fruit irregularly oval, about 2 inches long, naked, deep violet purple, at last bursting and dropping seeds and pulp; seed quite different from that of the last species, very obliquely obovate, almost curved from a narrow base, with an orbicular hilum, 0.9 l. long, smooth, shining, with a few irregular dots.

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Through the kindness of Dr. A. W. Chapman, of Apalachicola, Florida, I have received living specimens and fruit of the little southeastern sea coast Opuntia, so that I can now complete and correct the description of this very distinct

species.

Opuntia Pes Corvi, Le Conte in herb.; Engelm. App. to Syn. Cact. in Proc. Am. Acad. A. & S. 3, p. 346; Chapm. South. Flora, p. 145: læte viridis, diffusa; articulis parvis ovatis seu obovatis tumidis sæpius teretiusculus fragilibus; pulvillis pulvinatis; foliis ovatis cuspidatis incurvis; areolis junioribus albo-tomentosis setas parcas brevissimas pallidas et plerisque aculeos 1–3 rectos rigidos sæpe basi compressos tortosque obscuros gerentibus, infimis inermibus; floribus minoribus flavis; ovario obovato pulvillis perpaucis fusco-villosis stipato; sepalis exterioribus ovato-lanceolatis, interioribus obovatis cuspidatis; petalis sub-5 obovatis spatulatis obtusis; stigmatibus 4–5 erectis; seminibus paucissimis anguste obtuseque marginatis in pulpa viscosa baccæ sæpe floris rudimentis coronatæ nidulantibus.

Barren sands along the coast of Georgia and Florida. Joints 1-3 inches long, obovate, tumid, or narrower and subcylindric, usually many of them growing in the same season, one from the top of the last one, till they at last become prostrate, and 1 or 2 feet long; pulvilli somewhat prominent, 4, 6, or even 8 lines apart; leaves $2\frac{1}{2}-3\frac{1}{2}$ l. long; spines $1-1\frac{1}{2}$ inches long, very straight, when in threes, divergent. Flowers 1½-1¾ inches in diameter; sepals and petals less numerous. and narrower than in any allied species; ovary 1 inch long, with only 2 or 3 areolæ on its surface, and 3-5 on its upper edge. Fruit obovate, 6-7 l. long, rose-purple, with a shallow umbilicus, areolæ almost obliterated; seeds 2 l. in diameter, 1-3, rarely as many as 5, in one fruit. Evidently near O. vulgaris, from which the shape and armature of the joints sufficiently distinguishes it; far removed from O. fragilis, with which, at first glance, the tumidity and fragility of the joints would seem to connect it.

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MISSOURI BOTANICAL GARDEN

165 JOURNAL OF PROCEEDINGS. altogether 10.44 inches (average 14.06). From July 21 to August 8 no rain fell, while the heat was excessive, especially from July 29 to Aug. 7, when in the afternoon of every day but one it reached 99° to 101.5°. September 16, 1861. The President, Dr. ENGELMANN, in the chair. Six members present. The following publications were received: Canadian Naturalist and Geologist, and Proc. Nat. Hist. Soc. of Montreal, Vol. VI., Nos. 1-4, 1861, from the Society; Jour. Franklin Institute, Philad., No. 3, 1861, from the Institute; Proc. Entomol. Society, Philad., June-Aug. 1861, from the Society. Dr. Engelmann exhibited specimens and numerous drawings of two species of fungi, which infest our vineyards to such an extent as to materially diminish the crop and influence the culture of the grape, at least that of the Catawba, in our region. The first is a species of Botrytis, and perhaps the same as Berkeley's B. viticola, (very near B. acinorum, Pers.?) It makes its appearance in the latter part of June, on the lower downy surface of the leaves of the Catawba variety of Vitis Labrusca, (the only one extensively cultivated here,) forming irregular confluent spots. The horizontal fibres of the mycelium have a diameter of 0.005 line, finer and whiter than the hair of the down with which they are interwoven; the erect fructiferous stems, about 0.3-0.4 line high, and a little thicker than the horizontal fibres, bear numerous horizontal branches, upwards gradually shorter, the last divisions of which form very short pedicels, always 2 or 3 together, bearing oblong or oval, very deciduous spores, 0.008-0.011 lines in the longer diameter. About the same time the mildew appears on the pedicels, and often also on the young berries when they are of the size of small peas or smaller; Dr. E. never saw it on full grown berries. Those attacked on their surface or on their pedicels soon fall off; but the most material damage is done by the mildew infesting the leaves, whereupon the greater part of the berries will gradually turn yellowish-brown at their base, shrivel from that point, assume a club shape, and at last dry up entirely, usually remaining adherent to the withered racemes. This he designated as the brown rot. The second kind of rot—the black rot—is brought on by a very different fungus, which he believed was undescribed by botanists. It evidently belonged near Ehrenberg's genus Næmaspora, and ought to bear the name ampelicida. It makes its appearance only on nearly full grown berries, exhibiting in the first stage a discolored spot on the side, but never at the base of the berry, about 2 lines in diameter, with a dark dot in the centre. This spot soon becomes light-brown and remains so, while the surrounding part of the berry gets darker, and exhibits a rough or (under a magnifier) pustulous surface; gradually, now, the berry shrivels up and turns black. The individual fungi are little spherical bodies, (0.07-0.10 line in diameter,) formed under the surface in large numbers, which, growing, elevate, and at last burst the epidermis, then open at · their apex by a small jagged hole, and, shrivelling with the berry, eject a more or less curled or twisted thread, which, moistened, becomes gelatinous, and shows the innumerable oval sporules, (0.004-0.005 line long,) each imbedded in its coat of mucilage. These kinds of fungi are found either on distinct vines, or sometimes also on the same; they are very rarely seen on grapes cultivated in yards MISSOURI BOTANICAL copyright reserved GARDEN cm

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and on houses, but are very common, not to say universal, in our gardens and vineyards. in some seasons more so than in others. It is said that vineyards further north, e. g. in Northern Illinois, are free from these pests.

Whether other diseases assist in the destruction of the grape, as wine-growers will have it, he cannot, from his own experience, determine. He has never seen the Erysiphe, which is so destructive to the gooseberry, and to vines in graperies, on grapes cultivated in the open ground.

Dr. Hilgard presented a series of mounted specimens of Algæ.

October 7, 1861.

The President, Dr. Engelmann, in the chair.

Six members present.

A letter was read from A. F. Bandelier, Oct. 4, 1861, communicating meteorological observations for September, at Highland, Ill.

The Proc. Boston Soc. Nat. Hist., May-August, 1861, was

received as a donation to the library.

Dr. Shumard presented a small piece of meteoric iron from Denton Co., Texas.

Dr. Engelmann communicated the results of his investigations on the nature of the pulp of the Cactus fruit, illustrated by many drawings. Zuccarini, than whom none better understood the morphology, as well as the systematic characters of the Cactaceæ, had already in the year 1845 (Plant. nov., fasc. 5, pag. 34) expressed the opinion that in Cactaceæ, as well as in Cucurbitaceæ, the funiculi assisted in forming the pulp of the fruit. Schleiden (Grundzüge, ed. 3, p. 408) ascribes the pulp of Mamillaria to an arillus, dissolving into single juicy cells. Gasparrini, in his extended but rather odd description of the Opuntiæ fruit, (Osservazioni, 1853, p. 20,) also considers the pulp as a peculiar sort of an arillus. I had long since come to the conclusion, especially after examining the somewhat dry fruits of Cereus cæspitosus and Echinocactus setispinus, that the funiculi alone constitute the pulp, and in Cact. Mex. Bound., T. 20, fig. 12, I had figured the enlarged funiculi of the latter plant.

The Cactus fruit is usually succulent; only some Echinocacti and some Opuntiæ are known to bear dry fruits. The succulent fruit consists of the fleshy walls of the fruit itself, originating from the carpel and the adhering calyx, (or part of the stem, as Zuccarini will have it,) coalescing and forming a homogeneous mass, and of the juicy pulp, in which latter the seeds are imbedded. In some species the parenchyma of the walls, in others the mass of the pulp, prevails. The pulp is always the product of the funiculus or its appendages. The funiculus, even at the flowering period, bears on its inner side a beard of transparent fibres, 0.01-0.10 line in length; the fruit maturing, these fibres are enlarged, and the whole cellular tissue of the funiculus becomes, as it were, hypertrophic, every cell swelling up, filling with a sweetish, mostly red-colored juice; at last the cells in most species separate from one another, and leave the seeds floating in the pulp attached only to the slender spiral vessels. The mass of the funiculi and their proportion to the mass of the seed is very different in different species; in Lepismium Myosurus it constitutes only to or to of the seed; in Mamillaria Nuttallii it bears, perhaps, a still smaller proportion; while in other Mamillariæ, e. g. M. polythele and

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s l M. pusilla, it is 2-4 times as large as the seed. In the large edible fruits of Cerei, such as C. triangularis, C. grandiflorus, C. giganteus, etc., it constitutes by far the largest part of the fruit. The cells are globular, oval, or variously compressed; in some species I find them extremely small, 0.01-0.03 l. long, while in others they are 0.1-0.2 and even 0.3 l. long.

The genus Opuntia apparently differs in having the whole seed covered with juicy cells, which, in size and quantity, vastly predominate over the cells of the rather insignificant funiculus proper. But the whole bony coating of the seed being but an arillary enlargement of the funiculus, (Cact. Mex. Bound., p. 76,) this peculiar case entirely falls into the analogy of the other Cactaceæ. The real difference is caused by the nature of the arillus, which, getting extremely hard, leaves the cells of the epidermis only to grow out, and finally to form the pulp of the fruit. Soon after fecundation these cells gradually become elongated, cylindrical, and disconnected among one another, rising perpendicularly from the surface of the seed; they are shorter, of nearly equal length, and perfectly straight, on the faces of the young seed, and longer, hair-like, and twisting in different directions on and near the rim. In O. glaucophylla, which I take to be a mere variety of O. Ficus Indica, I find them at their first appearance on a seed of less than one line in diameter only about 0.004 l. long and wide; on the rim they soon grow to twice the diameter and ten times the length, till at maturity the larger ones are 0.3-0.5 l. long. These cells, at first simple and cylindrical, become at last jointed and clavate, the terminal cells being many times larger than the basal ones, thus properly filling the interstices between the seeds. During winter, the fruit and seeds having reached their full growth, these cells contain a colorless, viscous, insipid fluid; in the following spring, when the fruit has assumed a deep purple colour, and attained full maturity, they contain a sweetish, purple liquid, and soon separate, forming what is properly called the pulp. The single cells are mostly oval or oblong, 0.02--0.20 l. in length. I find the same structure in O. Engelmanni, which, however, ripens its fruit, with us, in autumn, and it undoubtedly obtains in all Opuntiæ with large and juicy fruit.

In O. Rafinesquii, and probably in all species with less juicy fruit, the cells on the face of the seed are not developed, only those on the rim producing the pulp, which in this species as well as in O. vulgaris and O. Pes Corvi, remains, even at full maturity, insipid and viscous and of pale red colour. In this condition the fruit adheres to the plant, without

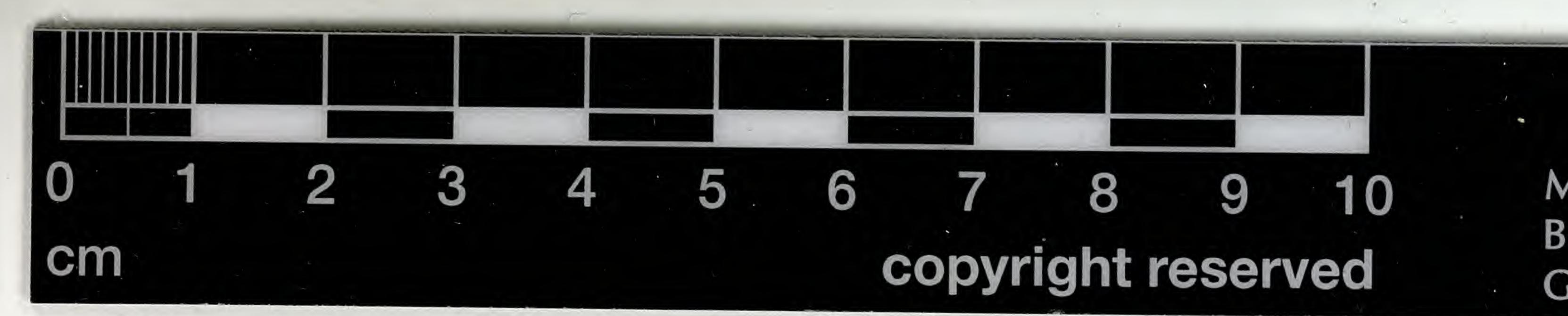
any change, until it falls off in the following spring.

In O. Brasiliensis and O. monacantha these epidermis-cells are greatly elongated, forming, in fact, a matted, tough beard, 2-3 lines long, analogous to that of the unripe cottonseed; each hair consists of several slender joints, 0.01-0.02 l. in diameter, the terminal one often thickly clavate or otherwise variously inflated. I have found them thus in the unripe fruit late in autumn; how they may change at maturity I have been unable to ascertain.

No such development of the epidermis-cells seems to take place in the Opuntiæ with dry fruit, such as O. Missouriensis, O. clavata, etc.; the seed, consequently, has a whiter, polished, ivory-like surface, while that of the juicy Opuntiæ fruits is dull and almost rough, and not so white.

The cells of the parenchyma of the fruit, as well as those of the bony seed-coat, are full of aggregations of crystals; those of the funiculus proper contain fewer and smaller clusters; but in the pulp itself I have never seen them; neither could I discover any in the parenchyma, or in the pulp of the fruits of Mamillariæ.

Dr. J. S. Newberry, of Cleveland, O., and Prof. Chas. T. Jackson, of Boston, Mass., were elected Corresponding Members.





October 21, 1861.

The President, Dr. Engelmann, in the chair.

Seven members present.

A letter was read from Dr. Charles T. Jackson, of Boston, acknowledging his election as a Corresponding Member.

The following donations to the library were received:

Rep. on the Economical Geology of the Route of the Ashtabula & New Lisbon Railroad, by J. S. Newberry, M.D., Cleveland, 1857,-Report on State-house Well, by J. S. Newberry, - Catalogue of Flowering Plants and Ferns of Ohio, by J. S. Newberry, M.D., 1860, from the Author; Proc. Boston Society Natural History, Sept. 1861, from the Society; Journal of the Franklin Institute, October, 1861, from the Institute; Bull. de la Soc. Imp. zool. d'Acclimatation, Paris, No. 9, 1861, from the Society; Canadian Nat. & Geologist, and Proc. Nat. Hist. Soc., Montreal, Vol. VI., No. 5, Oct. 1861, from the Society; Proc. Acad. Nat. Sciences, Philad., Aug. 1861, from the Academy; Faune Primordiale dans la Chaine Cantabrique, par Casiano de Prado, Ed. de Verneuil, et J. Barrande, Paris, Dépôt organique dans les loges aériennes des Orthocerés, par J. Barrande, -Obs. sur quelques genres de Céphe podes Siluriens, par J. Barrande, Extension de la Faune Primordiale Bohémie, par J. Barrande, Colonies dans le basin Silurien de la Bohémie par J. Barrande,-Troncation normale ou periodique de la coquille d' certains Céphalapodes paléozoiques, par J. Barrande,—Notes sur que ques nouveaux Fossiles dans le basin Silurien du centre de la Bohémie, 1855, par J. Barrande,-Le Système Taconique en Amérique, par J. Barrande, 1861,—Graptolites de Bohémie, par J. Barrande, 1850, - Analyse du travail de M. Ed. Suess sur les Brachiopodes de la Collection de Vienne, par M. Deshayes, - Notice biographique sur Mercier de Boissy, par M. D'Archiac, 1856,-Notice sur la vie et les travaux de Jules Haime, par M. D'Archiac, 1856,-Notes on the Cretaceous and Carboniferous Rocks of Texas, by Jules Marcou, Boston, 1861,—Lettres sur les Roches de Jura, par Jules Marcou, Liv. 2, Paris, 1860,—Parallèle entre les Dépôts Siluriens de Bohémie et de Scandinavie, par J. Barrande, Prague, 1856, from Prof. Jules Marcou; Primordial Zone of Texas, with Descriptions of New Fossils, by B. F. Shumard, 1861, from the Author.

Dr. Shumard presented Exogyra arietina from the Cretaceous of Texas, and several Naiades from the Ohio River.

Dr. Shumard called the attention of the Academy to a new Crustacean from the Cretaceous of Hempstead Co., Ark., presented to the museum by Dr. Koch. Dr. Shumard proposed for it the name *Mesostylus Americanus*.

Dr. Shumard exhibited a series of specimens of his Ostrea subovata (O. Marshii, Marcou) from the Washita Limestone of Fort Washita and Austin, Texas, and among them the original specimen described by him in Marcy's Report.

Prof. Joachim Barrande, of Prague, Bohemia, was elected a Corresponding Member.

MISSOURI BOTANICAL GARDEN GEORGE ENGELMANN PAPERS





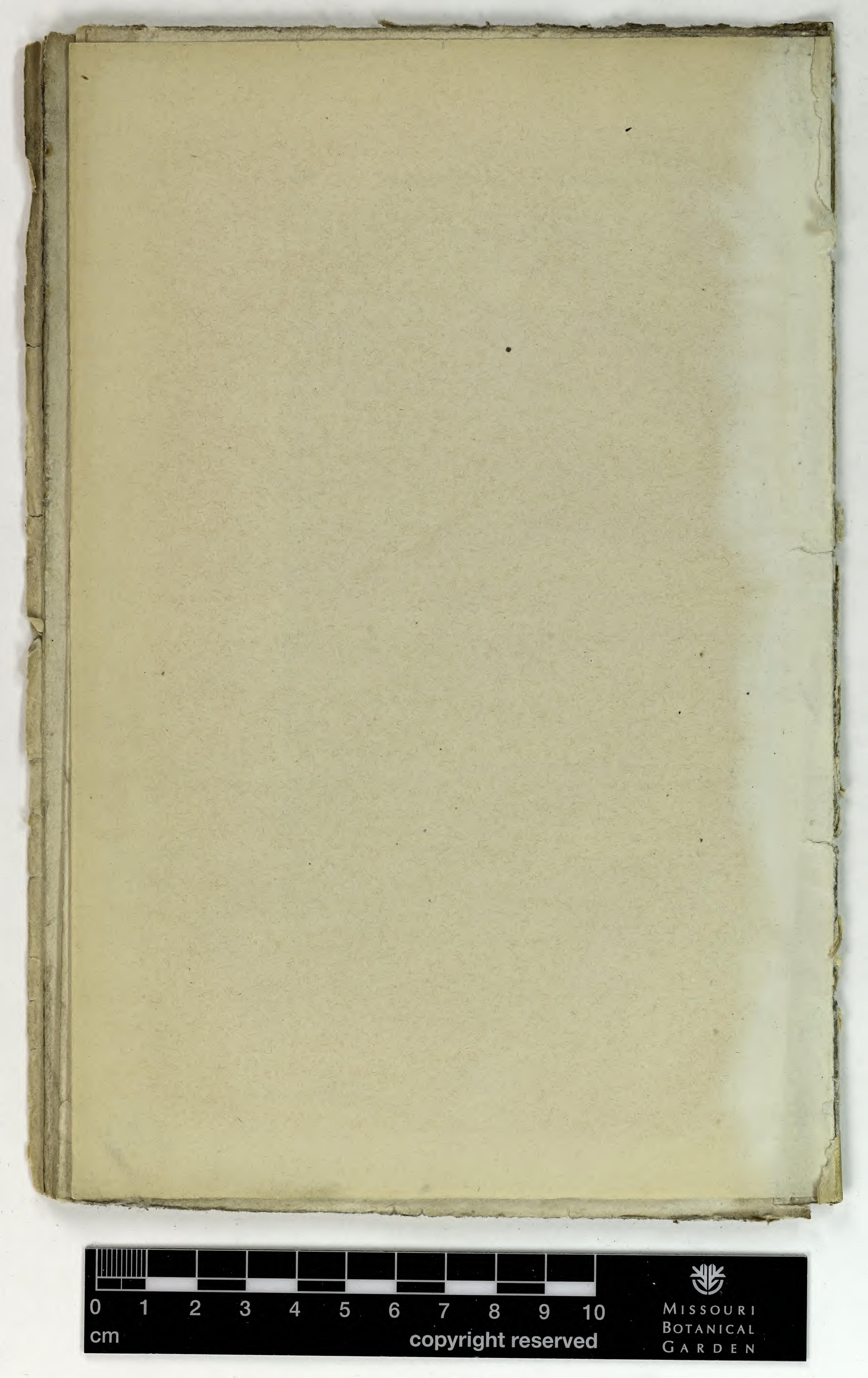
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ENGELMANN—ADD. TO CACTUS-FLORA OF U. S. Additions to the Cactus-Flora of the Territory of the United States. By George Engelmann, M.D. Since my Synopsis of the Cactaceæ of the United States* was published, Dr. J. S. Newberry, attached to Lieut. Ives' Expedition to the ColoradoRiver, 1857-'58, has elucidated more fully the natural history of several species, heretofore only imperfectly known.† In the same year, 1858, and the following one, my brother, Henry Engelmann, Geologist to the Expedition sent under Capt. Jas. H. Simpson, U. S. Topog. Eng., to explore the best emigrant routes through the interior of Utah, discovered in that interesting country a number of new forms, which were placed in my hands for examination. My report on them, illustrated by several plates from the hands of our skillful artist, Mr. P. Rætter, was in due time sent to the department; but the necessities of the country not permitting the official publication, I have received permission to communicate the substance of my investigations. 1. Mamillaria vivipara, Haw. Engel. Syn. Cact., p. 13. In the South Pass, and on Sweetwater River, no specimens of this wide-spread species have turned up from the other side of the great mountain chain. 2. Echinocactus Simpsoni, spec. nov.: e basi turbinata simplex, subglobosus seu depressus, mamilliferus; tuberculis laxis ovatis oblique truncatis axilla nudis; areolis ovatis seu ovato-lanceolatis, nascentibus albo-villosissimis mox nudatis; aculeis exterioribus sub-20 tenuibus rigidis rectis albidis, interioribus 8-10 erecto-patulis robustioribus paulo longioribus obscuris; areola florifera sub tuberculi apice aculeis contigua circulari; floribus in vertice dissitis minoribus; sepalis ovarii paucis et tubi brevis inferioribus orbiculatis crenulatis, superioribus ovatis obtusis, petalis oblongis cuspidatis e virescente roseis, stigmatibus 5-7 brevibus in capitulum globosum compactis; bacca parva sicca umbilico latissimo truncata flore marcescente demum deciduo coronata; seminibus paucis magnis oblique obovatis minute tuberculatis. Var. β. minor: tota planta, tuberculis, aculeis, seminibus minoribus. Butte Valley, in the Utah Desert, and Kobe Valley, farther west; var. β. in Colorado Territory, e. g. in coarse gravel or in crevices of rocks, abundant near Mount Vernon, at the base of the mountains, Parry, Hall & Harbour; fl. in May, fr. in July and August. With the New Mexican E. papyracan-* Proceedings Amer. Acad. Arts & Sciences, Vol. III., p. 259-314; p. 344-346, Nov. 1856. † See my account in Lieut. Ives' Colorado River Expl. Exped., Washington, 1861, Botany, p. 12-14. MISSOURI MISSOURI BOTANICAL GARDEN
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thus,* the Mexican E. horripilus, Lem., and perhaps the South American E. Odierii, Lem., and E. Cummingii, Salm, this species forms a small section of Echinocacti with the appearance of Mamillariæ, named by Prince Salm, (Hort. Dyck., 1849, p. 34,) Theloidei. Through the Coryphanthae they are nearly allied to Mamillaria, while our species at least, (the fructification of the others not being known,) by its dry fruit, its black tuberculated seeds, and especially the large and curved embryo and the presence of an albumen, proves itself a true Echinocactus, very closely connected with the regularly ribbed E. intertextus, Eng. Cact., Mex. Bound. t. 34. The similarity in all essential organs of these two species is such that no system ought to separate them, proving again of how little essential importance among Cactaceæ the external form must be regarded; another striking example, among many, is the rat-tail Cereus tuberosus, and its globular or oval

allies, C. cæspitosus, etc.

Full grown specimens are 3-5 inches high and 3-4 inches in diameter; dark green tubercles, loosely arranged in 3 or 13 order, 8 and 13 spirals being most prominent; tubercles 6-8 lines long, at base 6-7 l. wide in the vertical and 4-5 l. in the transverse diameter, fruit-bearing ones rather shorter and stouter; areolæ 3-4 l. long; external spines 4-6 l. long, whitish, with the addition of several bristles at the upper end of the areola; central spines 5-7 l. long, yellow, reddish, deep brown, or even black, upwards. Flowers 8-10 l. long, and of nearly the same diameter, with a short and wide tube, externally greenish purple, petals yellowish-green verging to pale purple; the short stamens arise from the whole inner surface of the tube, leaving only a very small nectariferous space in its base; funiculus very short, stout and straight, and not curved over the micropyle, as I have found it in almost all other cactus flowers examined. Fruit 3-3½ l. long, about the same in width, with 1-3 small calycine scales towards its flat top, each with 1 or 2 small spines in its axil; it usually bursts irregularly on the side, and, falling off, leaves its base adhering to the areola, as is the case in other dry-fruited Echinocacti; e. g. E. horizonthalonius. Seeds 1½ l. long in the longest diameter, covered with minute closely set tubercles, with a large oval subbasilar hilum, and an embryo strongly curved around a small albumen. The plant germinates with

^{*} Mamillaria papyracantha, Eng. Pl. Fendl., p. 49; Syn. Cact., p. 8. A closer examination of the dry specimen obtained by Mr. Fendler near Santa Fé proves that the floral areola joins the spiniferous one on the top of the small nascent tubercles, making the plant an Echinocactus, according to the views at present prevalent. It is singular that Fendler's single specimen has remained, thus far, the only one ever obtained of this well marked species.

erect pointed cotyledons, and when a few weeks old begins to develop its then pubescent spines.

Var. β . with smaller tubercles in $\frac{8}{27}$ or $\frac{13}{34}$, or even $\frac{21}{54}$ order, closely set, bearing smaller but often more numerous spines, (20-28 ext., 6-7 int.,) may be confounded with the simple mountain form of Mam. vivipara, from which, when not in flower or fruit, only a close examination can distinguish it.

3. Echinocactus pubispinus, spec. nov.: parvus turbinatus; costis 13 subobliquis compressis interruptis; areolis orbiculatis; aculeis breviusculis velutinis demum nudatis albidis apice adustis, radialibus inferioribus lateralibusque 5-8 brevioribus, superioribus 1-2 robustioribus rectis curvatis seu hamatis, centrali deficiente seu singulo robustiore longiore arrecto sursum hamato.

Pleasant Valley, near Salt Lake Desert, found in May without flower or fruit, but exhibiting in the vestiges of the small supraspiral floriferous areolæ the character of the genus. Perhaps the smallest species of the genus, 2 inches high, 1-1\frac{1}{4} in diameter; ribs formed by compressed confluent tubercles; areolæ 4-6 lines apart; radial spines 1-4 l. long, more

densely pubescent, or even tomentose, than I have seen them in any other Cactus; on the lower areolæ 5 or 6, on the upper ones 9-12; here and there a single central spine makes its appearance, 5-6 l. long, stouter, and always strongly hooked. 4. Echinocactus Whipplei, Engelm. & Bigelow, Cact.

Whipp. p. 28, t. 1; Syn. Cact., p. 15; Ives' Exped. Bot., p. 12. Var. spinosion: aculeis radialibus 9-11, inferioribus sæpe obscurioribus, reliquis longioribus niveis, summis 2 sæpe elongatis latioribus curvatis; centralibus 4, summo longo plano flexuoso, cæteris paulo brevioribus obscuris, solo infimo seu omnibus hamatis.

Desert Valley, west of Camp Floyd, Utah, with the remnants of flowers and fruit, and with seeds hid between the spines, exactly like the seeds figured in the plate cited above; embryo curved about \approx around a large albumen; stigmas 6-7. The locality is about 5 degrees north of the place where Dr. Bigelow, and afterwards Dr. Newberry, found the plant.

5. Cereus viridificorus, Engelm.; evidently the most northern Cereus, found as far north as the Laramie region, and not rare in Colorado, where it occurs 1-3 inches high, mostly with 13 ribs, and with the greatest variability in the color of the radial spines, and in the presence of the 1-2 central ones.

6. Cereus Engelmanni, Parry: in the Salt Lake Desert, far to the northwest of the country where it was originally discovered; always characterized by the cruciate central spines.

7. OPUNTIA SPHÆROCARPA, Eng. & Big. var.? UTAHENsis: diffusa; articulis orbiculato-obovatis crassis, junioribus

> MISSOURI BOTANICAL GARDEN.



sæpe globoso-obovatis vix tuberculatis; areolis subapproximatis; foliis minutis subulatis divaricatis; setis brevissimis, aculeis nullis seu parvulis seu rarius singulo longiore recto robusto albido; floribus sulphureis; sepalis exterioribus transversis obcordatis cuspidatis; petalis 8 late obovatis emarginatis; stigmatibus 8 brevibus erectis; bacca obovata areolis sub-25 stipata; seminibus irregulariter compressis anguste

marginatis.

In the Pass, west of Steptoe Valley, in the Utah basin; in flower and fruit at the end of July. Joints 2-3 inches long, and of nearly the same diameter; areolæ 6-8 lines apart; leaves smaller than in any other of our species, except O. basilaris, scarcely 1 line long; bristles few on young, none on old joints, about ½ l. long; stouter spines, when present, ¾-1 inch long. Flowers 3 inches in diameter, pale or sulphuryellow; fruit 1 inch long, half as thick, with a very deep umbilicus and with a few bristles, or here and there a minute spine on the areolæ—in the specimens before me apparently fleshy, but perhaps dry at full maturity; seeds very irregular, 2 l. or in the longest diameter 2½ l. wide. Loth to increase the number of illy defined species, I provisionally attach this to the New Mexican O. sphærocarpa, of which, however, leaves and flowers are as yet unknown, and the fruit is rather different.

8. Opuntia hystericina, Eng. & Big., is evidently a western representative, or may be a western form, of O. Missouriensis. (See Bot., Ives' Exp., p. 14.) It was collected in the present Territory of Nevada, between Walker and Carson Rivers. Flowers 2½-3 inches wide, larger than in Dr. New-

berry's specimen; stigmas 8-10, short, erect.

9. Opuntia Missouriensis, DeC., itself is not rare in the deserts between Salt Lake Valley and Rush Valley. Var. Albispina, approaching to var. trichophora, was found on Smith Creek, Lookout Mountains; flower 3-3½ inches in diameter; ovary with 20 or 25 scarcely spiny areolæ; 5 very

short erect stigmas.

10. Opuntia fragilis, Haw. Suppl., p. 82; Cactus fragilis, Nutt., gen. I, p. 296. Fort Kearney to the North Platte country, in flower in June and July. This, I believe, is the first time, since Nuttall's discovery in 1813, that the flowers of this species were collected. Travellers report the plant very common on the sterile prairies at the foot of the Rocky Mountains, but rarely found in flower, and still more rarely in fruit; it seems to propagate principally by the extremely brittle joints, which even the wind is apt to break off and carry about. I have had for many years specimens in cultivation, brought by Dr. Hayden, but have never been able to obtain flowers. Nuttall says the flowers are solitary and small; in the specimen before me they are nearly 2 inches in

diameter, pale yellow; ovary 8-9 l. long, with 13-15 areolæ, densely covered with white wool, the upper ones with a few white spines; lower sepals broadly oval, with a short cusp; petals 5 obovate, roundish, crenulate; style longer than stamens; stigmas 5, short, cuspidate, erect.

11. Opuntia pulchella, spec. nov.: parvula, diffusa; articulis obovato-clavatis leviter tuberculatis; foliis minutis e basi ovata subulatis; areolis confertis, superioribus aculeos albidos rectos, singulum longiorem complanatum porrectum seu deflexum, cæteros brevissimos radiantes gerentibus; floris purpurei ovario areolis 13–15 albo-villosissimis et aculeoligeris dense stipato; sepalis inferioribus lineari-oblongis breviter cuspidatis, superioribus cuneato-spatulatis; petalis 8 obovatis obtusis; stylo cylindrico exserto, stigmatibus 5 linearibus suberectis.

Sandy deserts on Walker River, Nevada; fl. in June. This is one of the smallest and prettiest species of the genus and belongs to the section Clavatæ (Syn. Cact., p. 46); it is readily distinguished from its allies by the small joints and purple flowers. Joints 1-1½ inches long; leaves scarcely 1 line long; flower bright purplish red or deep rose red, 1½-1½ inches in diameter; ovary 4-5 l. long, beset with white bristly spines, 15-25 on each areola; style not ventricose in the lower half, as is usual in this genus;* stigmas slender, pale yellow.

From other sources I am enabled to give the following further Additions and Corrections to my former publications:

Many Eumamillariæ (Syn. Cact., p. 4) have an "ovarium exsertum;" not only the large flowered Longimammæ, which approach closely to Corypantha, deviate in this respect from the assumed character of the subgenus, but in a great many other species I find the same peculiarity; so that I am inclined to restrict the ovarium immersum to that natural subdivision, the Lactescentes, already recognized by Zuccarini; probably all those with limpid juice have an exsert ovary.

Mamillaria barbata, Eng. This species is easily propagated by seed, and is apt to flower already in the second year. The first flowers in spring (May) appear in the axils of the last, innermost tubercles of the last year, and are, therefore, almost central; the later ones seem to be developed from the axils of the first tubercles of the same spring! Flowers 9-10 l. long, of the same diameter; tube constricted above the exsert oval ovary; 12-13 exterior green sepals, lanceolate, cuspidate, fimbriate, 8 interior ones, reddish, longer, lance-linear,

^{*} Another deviation from the usual form I observe in the style of O. coccionellifera; from a very narrow and short base it is suddenly dilated 5 or 6 times its diameter, and then gradually contracts upwards.

slightly ciliate; 18-21 petals, rose red, with a deeper colored streak, lance-linear, shorter and narrower than the inner sepals, entire; stamens not half as long as petals, with oval anthers; style much longer than stamens, with 5-6 short, greenish yellow suberect stigmas.

Mamillaria bicolor, Lehm., is not a Texan plant, as has been stated, inadvertently, in Synops. p. 7. Dr. Poselger found it on another Rio Grande, between Tampico and Real

del Monte, Mex.

Mamillaria papyracantha, Eng., is an Echinocactus, as

stated above.

Mamillaria recurvispina, Eng., in Cact. Mex. Bound., p. 12; Syn. p. 10. As there is already a species named thus by Vriese, (see Walp. Rep. 2, p. 301,) I now name the Arizona species M. recurvata. M. recurva, Lehm., is a form of

M. macracantha, D.C., fide Salm.

Cereus variabilis, thus named in Cact. Mex. Bound., p. 40 t. 60, f. 5-6, and in Synops. p. 31, is not Pfeiffer's plant, figured in Abbild. 2, t. 15, but seems to be, as regards fruit and seeds, identical with a species obtained by Dr. Poselger near Tampico, and decided by him to be C. princeps, Hort. Würzb. ex-Pfeiff. Enum. p. 108. Plants from the Rio Grande have repeatedly bloomed here at the late Mr. Grieve's, and as the flower has never been described, I here supply the omission. Fruit and seed, obtained near Matamoras, have been described and figured in Mex. Bound. Cact. l. c.

Flores ad apicem caulis ramorumve pauci magni albi nocturni; ovario ovato areolis aculeolatis 25-30 stipato; tubo elongato cylindrico sursum sensim ampliato areolis 16-20 vix squamigeris, inferioribus aculeolatis munito; sepalis superioribus 20-25 lanceolatis patulis reflexisve; petalis 40-50 pluriseriatis lineari-lanceolatis patentissimis; staminibus superiori tubi parti gradatim adnatis; stigmatibus 12-13 in capitulum clavato-obovatum coarctatis pallide virescentibus.

In bloom from July to September, flower 7-8 inches long, 5½-6 inches wide; tube 4-5 inches long; lower sepals near the well defined upper edge of the tube reddish green, 3-9 lines, upper ones petaloid, 9-18 l. long; petals 2 inches long, and about 4 l. wide; lower part of tube for 2 or 21/2 inches, with a naked, nectariferous surface; the upper part, 2½-3 inches, densely beset with stamens of about equal length, so that the mass of the anthers form a deep funnel, corresponding to the shape of the upper part of the tube; the outer series of stamens forms a regular crown, but is not separated from the inner lower ones by a naked belt, such as is found in many species; nor are the filaments declined, and, so to say, fasciculated. This is interesting, as it weakens the value of this arrangement of stamens as a generic or subgeneric character; nevertheless, it is one of the few general charac-



ters left us, to be used in the arrangement of the very large number of species of this protean genus, to which several lately established genera have to be reduced. The following disposition is suggested:

1. Cerei flore regulari, plerumque breviore; staminibus tubo gradatim adnatis.

Echinocereus, Eng. Acanthocereus. Lepidocereus, Eng. Pilocereus, Lem.

2. Cerei flore sæpe obliquo, plerumque longiore; corona staminum exteriorum erectorum a cæteris gradatim adnatis plus minus declinatis discreta.

A LONG A CONTROL TO FEEL OF THE SE

Echinopsis, Zucc. Eucereus. Phyllocactus, Link. Disisocactus, Lindl.

Under the name Acanthocereus I comprise the species of this division with spiny fruit, but not belonging to Echinocereus; it is probable that Pfeiffera, Salm, is only a diminutive form of Acanthocereus. Lepidocereus, to which many tropical species must be referred, and also a few which lately have been classed with Pilocereus, is distinguished from the latter by the uniformity of the fertile and sterile branches and areolæ, while in Pilocereus the fertile areolæ are closer together and densely beset with bristly spines or long wool. Eucereus, in a more restricted sense than Miquel has used it in his Genera, or I in the Synopsis, would comprise the largest number of Cerei of the second division, of very different external shape, and would probably have to be again subdivided when we get to know more of the fructification of the different species. Neither Echinopsis nor Phyllocactus do in their flowers differ from Eucereus, and Disisocactus is but a depauperate Phyllocactus, with scarcely more than the crown of stamens left, a few single ones representing the great mass of inner stamens of the allied sections. I am as yet undecided whether Epiphyllum, as restricted by Prince Salm, has also to be united with Cereus or not; the fasciculated declined stamens spring from the whole tube; the exterior ones form no crown, but the innermost ones are separated from the rest, and form, with their confluent bases, a kind of vault, which is arched over the base of the tube. I have had no opportunity to examine fruit and seed.

I am not sure whether the true Cereus variabilis is also found on the Lower Rio Grande. A specimen in Mr. Gæbel's horticultural establishment, said to come from that region, has repeatedly flowered and borne fruit; the flowers opened in May, and the fruit ripened after 10 or 11 months; flower 9 inches long, white, open only at night; ovary angular, with 5 or 6 triangular scales, but no spines; long tube with about 8 scales; crown of exterior stamens distant from the others 8 or 9 lines; about 10 filiform spreading stigmas; fruit irregularly oval, about 2 inches long, naked, deep violet purple, at last bursting and dropping seeds and pulp; seed quite different from that of the last species, very obliquely obovate, almost curved from a narrow base, with an orbicular hilum, 0.9 l. long, smooth, shining, with a few irregular dots.

Through the kindness of Dr. A. W. Chapman, of Apalachicola, Florida, I have received living specimens and fruit of the little southeastern sea coast Opuntia, so that I can now complete and correct the description of this very distinct

species.

Opuntia Pes Corvi, Le Conte in herb.; Engelm. App. to Syn. Cact. in Proc. Am. Acad. A. & S. 3, p. 346; Chapm. South. Flora, p. 145: læte viridis, diffusa; articulis parvis ovatis seu obovatis tumidis sæpius teretiusculus fragilibus; pulvillis pulvinatis; foliis ovatis cuspidatis incurvis; areolis junioribus albo-tomentosis setas parcas brevissimas pallidas et plerisque aculeos 1–3 rectos rigidos sæpe basi compressos tortosque obscuros gerentibus, infimis inermibus; floribus minoribus flavis; ovario obovato pulvillis perpaucis fuscovillosis stipato; sepalis exterioribus ovato-lanceolatis, interioribus obovatis cuspidatis; petalis sub-5 obovatis spatulatis obtusis; stigmatibus 4–5 erectis; seminibus paucissimis anguste obtuseque marginatis in pulpa viscosa baccæ sæpe floris rudimentis coronatæ nidulantibus.

Barren sands along the coast of Georgia and Florida. Joints 1-3 inches long, obovate, tumid, or narrower and subcylindric, usually many of them growing in the same season, one from the top of the last one, till they at last become prostrate, and 1 or 2 feet long; pulvilli somewhat prominent, 4, 6, or even 8 lines apart; leaves $2\frac{1}{2}-3\frac{1}{2}$ l. long; spines $1-1\frac{1}{2}$ inches long, very straight, when in threes, divergent. Flowers 1½-1¾ inches in diameter; sepals and petals less numerous and narrower than in any allied species; ovary 1 inch long, with only 2 or 3 areolæ on its surface, and 3-5 on its upper edge. Fruit obovate, 6-7 l. long, rose-purple, with a shallow umbilicus, areolæ almost obliterated; seeds 2 l. in diameter, 1-3, rarely as many as 5, in one fruit. Evidently near O. vulgaris, from which the shape and armature of the joints sufficiently distinguishes it; far removed from O. fragilis, with which, at first glance, the tumidity and fragility of the joints would seem to connect it.